

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowden (UK Patent Application No GB-2389621) in view of Thom (German Patent No. DE-19625259, already of record), and further in view of Wood (U.S. Patent No. 6,146,491, already of record). A machine translation of Thom was provided in a previous Office action; all citations to Thom refer to paragraph numbers in the machine translation. Regarding claim 10, Bowden teaches a method for repairing, in situ, a hollow support structure that has a deteriorated portion and an access opening (see page 1, paragraph 1 and page 4, paragraph 3) comprising pouring an aggregate material into the hollow support structure to substantially fill the hollow support structure at least over the depth of the deteriorated portion (see page 5, paragraph 2 and Figure 1)); and allowing the aggregate to cure in situ (see page 5, paragraph 2).

Bowden does not teach providing a high tensile strength sleeve with a closed lower end in the hollow support structure that extends over the depth of the deteriorated portion and substantially filling the sleeve with the aggregate. Thom teaches a method of reinforcing a hollow pole (see page 1, paragraph 8) comprising the steps of placing a

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fabric sleeve having a mouth (see tubular sleeve 2 in Figure 1) through an access opening in the hollow pole (see page 2, paragraph 23) and forcing it into the interior of the pole so that it extends into the in ground portion to a depth that extends of the deteriorated portion of the pole (see page 3, paragraph 1), expanding the sleeve until it contacts the inner surface of the pole (see page 3, paragraphs 4-5), and solidifying the sleeve (see page 3, paragraph 10). Thom teaches that the sleeve comprises a high tensile strength material (see page 2, paragraph 12 and page 3, paragraph 12) which is impregnated with epoxy resin (see page 2, paragraph 14 and page 3, paragraph 16). It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the methods taught by Bowden and Thom for the benefit of further reinforcing the hollow pole, especially in those situations in which the in ground portion of the pole cannot be excavated. While Thom does not teach locating the mouth (i.e., the top) of the sleeve in the access opening, it would have been obvious to one of ordinary skill in the art at the time of the invention to have done so for the convenience of being able to control the flow of the aggregate into the center of the sleeve.

Bowden, as modified by Thom, does not teach a sleeve with a closed lower end. Bowden suggests that the extent to which the hollow support structure is filled with aggregate may be limited by inserting "blanking plate" into the structure (see page 5, paragraph 2). One of skill in the art readily appreciates that placing the sleeve of Thom in the proper position may be exceedingly difficult in situations where the access opening is far removed from the deteriorated portion. Wood teaches a method of inserting a sleeve into a hollow structure by closing the end of the sleeve and pushing

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the sleeve into the hollow structure with a rod (see Figures 3 and 4). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Bowden, as modified by Thom, by closing the bottom of the sleeve and pushing it into place with a rod, as taught by Wood, for the benefit of eliminating the need for and cost associated with the “memory effect” sleeve material taught by Thom. Because Bowden teaches that it is desirable to limit the extent to which the aggregate fills the hollow support structure, it would have been obvious to one of ordinary skill in the art at the time of the invention to have left the end of the sleeve closed after placing it in the hollow support structure and then substantially filled the sleeve with aggregate since the sleeve would already have a closed end that would serve to limit the extent of the aggregate, thus eliminating the need for a separate blanking plate.

Regarding claim 11, Bowden teaches a method wherein the hollow support structure has an in-ground portion and an above-ground portion (see Figure 1), and wherein the hollow support structure has a deteriorated portion extending at least partially into the in-ground portion (see page 1, paragraph 3 and Figure 1), and an access opening in the above-ground portion (see Figure 1).

3. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Bowden (GB-2389621), Thom (DE-19625259), and Wood (US 6,146,491) as applied to claim 11 above, and further in view of Hillyer (U.S. Patent No.

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3,577,979, already of record). Regarding claims 12, 14, and 15, Bowden, as modified by Thom and Wood, teaches placing a high tensile strength sleeve into the hollow support structure and forcing the sleeve into the in-ground portion of the structure such that it extends over the depth of the deteriorated portion (see Figures 3 and 4 of Wood). It would have been obvious to one of ordinary skill in the art at the time of the invention to have left the mouth (i.e., the end opposite the closed end) of the sleeve in the opening of the structure for the benefit of enabling filling of the sleeve with the aggregate while preventing the sleeve from slipping into the structure. Bowden, as modified by Thom and Wood, teaches the use of concrete, but does not teach an epoxy resin aggregate. Hillyer teaches an epoxy resin concrete comprising sand, gravel, saturating epoxy and epoxy hardener (see column 2, lines 22-25 and 45-62; see column 5, line 59 through column 6, line 46). Hillyer teaches that incorporation of epoxy resin into concrete increases its resistance to chemicals and corrosion (see column 2, lines 14-25). It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the epoxy resin concrete taught by Hillyer in the method of Bowden, as modified by Thom and Wood, for the benefit of increasing the corrosion and chemical resistance of the repair. Hillyer teaches a composition comprising 20-80% epoxy, 1-50% curing agent or hardener (see column 7, lines 20-25), sand and gravel (see column 2, lines 45-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to have optimized the composition of the concrete, including the relative amounts of epoxy, hardener, sand, and gravel, for the benefit of

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achieving the desired strength of the concrete and based on economic considerations (see Hillyer, column 2, lines 55-61 and column 7, lines 10-19).

Regarding claim 13, Bowden, as modified by Thom, does not teach forcing the sleeve into the in-ground portion of the hollow support structure by tying off the sleeve, inserting a rod into the sleeve, and using the rod to push the sleeve into the hollow support to the predetermined depth. One of skill in the art readily appreciates that placing the sleeve of Thom in the proper position may be exceedingly difficult in situations where the access opening is far removed from the deteriorated portion. Wood teaches a method of inserting a sleeve into a hollow structure by closing the end of the sleeve and pushing the sleeve into the hollow structure with a rod (see Figures 3 and 4). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Bowden, as modified by Thom, by closing the bottom of the sleeve and pushing it into place with a rod, as taught by Wood, for the benefit of eliminating the need for and cost associated with the “memory effect” sleeve material taught by Thom.

4. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Bowden (GB-2389621), Thom (DE-19625259), and Wood (US 6,146,491) as applied to claim 10 above, and further in view of Minayoshi (U.S. Patent No. 6,890,461). Bowden, as modified by Thom and Wood, is silent regarding wrapping predetermined portions of the hollow support structure prior to contain the high strength sleeve and the aggregate material in the hollow support structure. Minayoshi teaches a

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method of reinforcing a hollow support structure with epoxy aggregate (see column 1, lines 12-14 and 54-58; see column 12, lines 29-38) wherein an aramid fiber seat may be wrapped around the exterior of the structure to provide further reinforcement (see column 15, lines 11-18). Minayoshi teaches that this step may be performed after the interior of the structure is reinforced (see column 15, line 11). One of skill in the art recognizes that hollow poles such as those taught by Bowden and Minayoshi may at times deteriorate to the point that holes are formed in the wall of the pole, allowing water to penetrate into the interior of the pole. In such a situation, it would have been obvious to one of ordinary skill in the art at the time of the invention to have applied the aramid fiber seat to the exterior of the structure before reinforcing the interior of the deteriorated portion of the structure to prevent the sleeve and aggregate from bulging or oozing out of the hole.

Response to Arguments

5. Applicant's arguments with respect to claims 10-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM BELL whose telephone number is (571)270-7067. The examiner can normally be reached on Monday - Thursday, 7:00 am - 4:30 pm; Alternating Fridays, 7:00 am - 3:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip Tucker can be reached on 571-272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/WILLIAM P BELL/
Examiner, Art Unit 1745

/Philip C Tucker/
Supervisory Patent Examiner, Art Unit 1745